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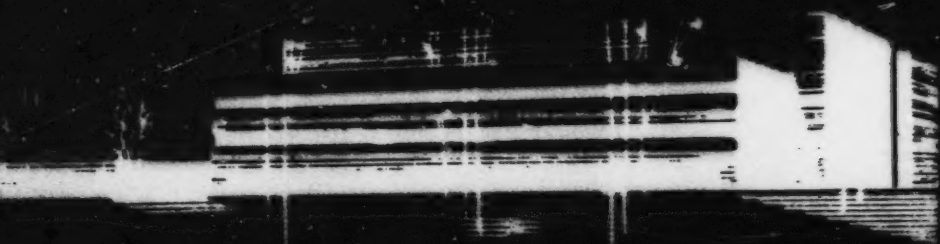
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GREAT LAKES FOREST RESEARCH CENTRE.
PROGRAM REVIEW
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PROGRAM REVIEW

Great Lakes Forest
Research Centre

1983 84



PROGRAM REVIEW

GREAT LAKES FOREST RESEARCH CENTRE

CANADIAN FORESTRY SERVICE

DEPARTMENT OF THE ENVIRONMENT

1983-84

© Minister of Supply and Services Canada 1984

Catalogue No. Fc41-12/1984E

ISBN 0-662-13346-3

ISSN 0822-1650

Copies of this publication may be obtained from:

Great Lakes Forest Research Centre

Canadian Forestry Service

Department of the Environment

P.O. Box 490

Sault Ste. Marie, Ontario

P6A 5M7

THE CANADIAN FORESTRY SERVICE

DEPARTMENT OF THE ENVIRONMENT

The Canadian Forestry Service (CFS) is the principal source of federal expertise in forestry. Its general objective is to promote the wise management and use of Canada's forest resource for the economic, social, and environmental benefit of Canadians.

The following are the main functions of the CFS:

1. providing coordinated federal policies to promote forest industry development and better resource management;
2. providing scientific and technical leadership through research and development;
3. providing and analyzing national and international information and statistics as a basis for policy;
4. aiding in developing and certifying codes and standards of product performance;
5. protecting Canada's forests from foreign pests;
6. supporting provincial forest renewal programs to insure permanent viability of the forest resource;
7. fostering the potential use of the forest resource for energy;
8. contributing to the environmental objectives of the Department of the Environment (DOE).

A number of federal agencies are involved in forestry programs, and a Federal Forestry Sector Strategy Committee has been established to coordinate federal forestry activities. The CFS has been designated the lead agency.

In September, 1982, the CFS assumed responsibility for regional economic development from a forestry standpoint. In this context the Service is required to negotiate federal-provincial forest renewal agreements of intensive forest management practices to meet the objective of the federal Forestry Sector Strategy. As a result, the CFS is also involved in the development of economic profiles and studies to identify regional and national needs, and development opportunities.

The CFS is composed of a headquarters unit, six forest research centres, and two national institutes. The forest research centres are responsive to regional priorities and maintain close liaison with the respective provincial government forestry departments. They also participate in, and frequently lead, national

programs. The national institutes provide the focus for programs of national scope. The headquarters unit comprises three directorates: Research and Technical Services, which plans, directs and coordinates the research and development programs and technical services of the CFS; Forestry Relations, Economics, and Development, which handles forestry relations with universities, industry and other governments, does economic analyses, and coordinates the forestry development and employment stimulation programs; and Finance, Planning, and Administration, which manages the support services of the CFS in planning and program evaluation, finance, administration, and human resources management.

LE SERVICE CANADIEN DES FORÊTS

MINISTÈRE DE L'ENVIRONNEMENT

Le Service canadien des forêts (SCF) réunit la majorité des spécialistes fédéraux en foresterie. Son objectif général est de promouvoir l'aménagement et l'utilisation judicieux des ressources forestières du Canada pour le plus grand bien économique, social et environnemental des Canadiens.

Voici les principales fonctions du SCF:

1. fournir des politiques fédérales coordonnées afin de favoriser l'expansion de l'industrie forestière et l'amélioration de la gestion des ressources;
2. fournir une orientation scientifique et technique par la recherche et le développement;
3. fournir et analyser l'information et les statistiques nationales et internationales qui serviront de base aux politiques;
4. aider à la mise au point et à la certification des codes et des normes en matière de performance des produits;
5. protéger les forêts canadiennes en luttant contre les ravageurs étrangers;
6. appuyer les programmes provinciaux de régénération forestière afin d'assurer la viabilité permanente des ressources forestières;
7. parrainer l'utilisation éventuelle des ressources forestières pour la production d'énergie;
8. adhérer aux objectifs environnementaux du ministère de l'Environnement (MDE).

Depuis septembre 1982, le SCF assume la responsabilité du développement économique régional dans le domaine forestier. À ce titre, il doit conclure des ententes fédérales-provinciales, relatives à la régénération forestière, sur des méthodes de gestion intensive des forêts afin d'atteindre les objectifs de la stratégie forestière du Canada. Le SCF doit conséquemment participer à la mise au point de profils et d'études économiques afin de cerner les besoins sur les plans régionaux et nationaux, de même qu'aux possibilités de développement.

Le SCF comprend une administration centrale, six centres de recherches forestières et deux instituts nationaux. Les centres de recherches forestières doivent répondre aux impératifs régionaux et entretenir une liaison étroite avec les ministères provinciaux des Forêts. Ils participent également à des programmes nationaux dont ils assument fréquemment la direction. Les instituts nationaux sont les foyers des programmes d'envergure nationale.

L'Administration centrale comprend trois directions générales: Recherche et Services techniques, dont le rôle consiste à planifier, diriger et coordonner les programmes de recherche et développement ainsi que les services techniques du SCF; Relations, Économie et Développement, qui s'occupe des relations forestières avec les universités, l'industrie et les autres gouvernements, fait des analyses économiques, et coordine des programmes de développement forestier et de création d'emplois; et Finances, Planification et Administration, qui dirige les services de soutien du SCF dans la planification, l'évaluation des programmes, les finances, l'administration et la gestion du personnel.

DEPARTMENT OF THE ENVIRONMENT

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Assistant Deputy Minister
Canadian Forestry Service

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Economics, and Development

Director General
Research and
Technical Services

Director General
Finance, Planning,
and Administration

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Northern Forest Research Centre
Edmonton, Alberta

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Newfoundland Forest Research
Centre
St. John's, Newfoundland

Director
Forest Pest Management Institute
Sault Ste. Marie, Ontario

Director
Petawawa National Forestry Institute
Chalk River, Ontario

MINISTÈRE DE L'ENVIRONNEMENT

MINISTRE

Sous-ministre

**Sous-ministre adjoint
Service canadien des forêts**

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Relations, Economie
et Développement**

**Directeur général
Recherches et
services techniques**

**Directeur général
Finances, Planification
et Administration**

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Centre de recherches forestières
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Centre de recherches forestières
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Centre de recherches forestières
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Centre de recherches forestières
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Frédéricton (Nouveau-Brunswick)**

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Centre de recherches forestières
des Grand Lacs
Sault Ste-Marie (Ontario)**

**Directeur régional,
Terre-Neuve et Labrador
Centre de recherches forestières
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Saint-Jean (Terre-Neuve)**

**Directeur
Institut pour la répression des
ravageurs forestiers
Sault Ste-Marie (Ontario)**

**Directeur
Institut forestier national de
Petawawa
Chalk River (Ontario)**

Regional Director: J.H. Cayford

Deputy Director and Program Director, Forestry Development: R.A. Haig

Program Director, Research and Technical Services: C.R. Sullivan

Research Manager, Forest Resources: L.F. Riley

**Research Manager, Environmental Forestry and Fire: I.K. Morrison (E.S. Kondo
1983)**

Support Staff: G. Londry, H.M. MacDonald, M.C. Rupprechter

Chief of Administration: R.M. Dean

Chief, Socio-economic Analysis and Planning: J.H. Smyth

Chief Implementation Officer: D.W.J. McGowan

Head, Scientific and Technical Information Services: C.A. Plexman



FOREWORD

The Great Lakes Forest Research Centre (GLFRC), located in Sault Ste. Marie, Ontario, is one of six regional forestry centres operated by the Canadian Forestry Service (CFS). The CFS has responsibility for fulfilling the federal government's mandate related to the forest resource. It also supports Environment Canada activities in priority areas such as acid rain and toxic chemicals. The government's objective is to ensure the long-term development and international competitiveness of the forest sector in an environmentally appropriate manner. A stable, long-term supply of competitively priced wood and industrial productivity are two major components of this issue. Current priorities in the CFS relate to forest renewal strategy, research, development and technology transfer, technological innovations and human resources. GLFRC is responsible for the forestry program in Ontario.

Since its inception in 1965, GLFRC has been involved primarily in forest research and associated technical services. During 1982-1983, the Centre assumed responsibility on behalf of the federal government for administration of the Canada-Ontario Forest Management Subsidiary Agreement (FMSA) and for Ontario programming under the Unemployment Insurance/Job Creation Program - Forestry Sector (UI/JC-FS) which was cosponsored by the Canada Employment and Immigration Commission. In addition, the Centre has been involved in developing a new Canada-Ontario Forest Resource Development Agreement (FRDA) to replace the FMSA, which expired on 31 March 1984. During late 1983-1984 the Centre became responsible for managing the forestry projects of Environment 2000, an environmentally oriented job creation program to be implemented in 1984-1985.

Two major Program Directorates are responsible for the effective management of both new and continuing programs. The Program Director for Research and Technical Services is C.R. Sullivan, and the Program Director for Forestry Development is R.A. Haig. Mr. Haig also serves as Deputy Director.

A major portion of the research program continues to be concerned with the issue of long-term wood supply. We are involved in various forest renewal projects, with emphasis on black spruce ecosystem silviculture and on mechanization of silviculture. A major effort is also directed to the reduction of losses from insects, diseases and fires. Projects deal with forest fires, spruce budworm, biological control of insects and forest pathology. A major cooperative project deals with the impact of long-range transport of air pollutants on forest ecosystems. Because of the transprovincial nature of our forest resource, many elements of our research program are of national significance.

The Centre is involved in a number of national technical services programs. These include the Forest Insect and Disease Survey, a continuing program of

surveillance of forest insect and disease conditions, and the Canadian Forest Resources Data Program, which provides statistical information on Canada's forests. The Centre also provides the major federal focus for forestry in Ontario.

Much of our research is carried out in cooperation with the province of Ontario. Under a Canada-Ontario agreement, a Canada-Ontario Joint Forestry Research Committee (COJFRC) has been established to coordinate planning and implementation of forestry research programs carried out by both governments. In 1983-1984 the committee sponsored a symposium on jack pine management.

One additional research project, Reforestation Silviculture, was established in 1983-1984. This change reflected a reorganization of the project Biological and Operational Aspects of the Mechanization of Silviculture.

In 1983-1984 work began on a major expansion of the Great Lakes Forest Research Centre/Forest Pest Management Institute facility. Funds for the \$13 million project came from the federal government's Special Recovery Projects Program. Phase I, which involved the completion of a greenhouse and attached header-house, a workshop and storage building, chemical storage building and installation of site services, was completed in 1983-1984. The major expansion will begin early in 1984-1985.

This report outlines progress made during fiscal year 1983-1984 on each project. Our expenditures increased to \$21 million, and we had a full-time staff of 163. During the year I.K. Morrison was appointed Research Manager, Environmental Forestry and Fire, to replace E.S. Kondo who was transferred to Ottawa. During the same period, three employees of the Centre retired. They were W.L. Sippell, Entomologist, who had a 33-year career with GLFRC, J.W. Harazny, Finance Officer; and H. Weir, District Supervisor, Forest Insect and Disease Survey. J.C. McAlpine, Office Processing Systems Operator, left to take another position. Staff additions included: V.G. Neale, Research Scientist, Ecology/Biological Control; M.T. Dumas, Research Scientist, Forest Pathology; J. Johnson, Economist; G.D. Hogan, Research Scientist; J. Longo, Finance Officer, and J. Theriault, Office Processing Systems Operator.

J.H. Cayford
Regional Director
Great Lakes Forest Research Centre

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Forest Environment Research



IMPACT OF LONG-RANGE TRANSPORT OF AIR POLLUTANTS ON THE BIOGEOCHEMISTRY OF FOREST ECOSYSTEMS

Professional Staff: N.W. Foster (Project Leader), G.D. Hogan (1984), J.A. Nicolson

Support Staff: L. Chartrand, P.W. Hazlett, A.W. Johns, D.J. Kurylo, J.A. Ramakers, D. Ropke

Objectives

To elucidate the influence of atmospheric deposition of acidifying substances on biogeochemical properties and processes, and on productivity of old-growth hard maple-yellow birch forest on shallow till soil; to elucidate the influence of forests and forest soils on acid precipitation.

Achievements

Participated in the Acid Rain and Forest Resources Conference, sponsored by the CFS and the USDA Forest Service, in Quebec City in June 1983; measured the quality and quantity of water within 20 terrestrial sub-basins at the Turkey Lakes Watershed; completed forest floor weight estimates, soil analyses and biomass repression-bioelement content estimates for stands at three sites at the Watershed; supervised a contract for documenting the influence of synthetic rainfall, at varying pH, on the chemistry of soil and soil percolate.

Goals for 1984-1985

To report on the neutralization of acid precipitation within a tolerant hardwood forest system, and on the input-output of major ions by small terrestrial feeder streams in the Turkey Lakes Watershed; to establish greenhouse and/or field experiments to examine the effects of simulated acid rain and heavy metals on physiological processes in trees and seedlings.



Forest Production Research



BLACK SPRUCE ECOSYSTEM SILVICULTURE

Professional Staff: J.K. Jeglum (Project Leader), R.L. Fleming, A. Groot, V.F. Haavisto, B. Payandeh, R.A. Sims

Support Staff: M.J. Adams, G.T. Atkinson, D. Mossa, M. Siltanen, S. Taylor

Objectives

To develop a classification system for black spruce ecosystem types in Ontario for forest management purposes; to determine if modified cutting and direct seeding are feasible alternatives to clearcutting and planting for regenerating black spruce; to determine the feasibility of intensive treatments such as drainage and fertilization to increase productivity on black spruce peatlands; to determine the impact of current forest management practices on black spruce ecosystems.

Achievements

Completed and published in a field guide the findings of a 5-year cooperative program on forest ecosystem classification (FEC) for Ontario's Clay Belt; began a cooperative FEC program for three forest regions in the Thunder Bay area and prepared a first approximation of the classification; prepared for a symposium an overview of peatland forestry in Ontario summarizing major problems and current silvicultural practices in black spruce; published a report on studies of windfall and mortality in upland black spruce strip cuts, which revealed that the most important factors were leave time, strip edge:area ratio, stand density and site index.

Goals for 1984-1985

To prepare a simulation model allowing for interactive evaluation of long-term forestry investments; to assist the Ontario Ministry of Natural Resources (OMNR) in the first major operational drainage trial in northern Ontario forest peatlands, to be undertaken in the Timmins-Cochrane area; to publish a report on seeding of black spruce with the Brühm seeder and Piper PA-18A aircraft; to show seed distribution and deposition patterns and the effects of various flying parameters on them.

MECHANIZATION OF SILVICULTURE

Professional Staff: C.R. Smith (Project Leader), J-D. Leblanc, B.J. Sutherland

Support Staff: F.F. Foreman, D.J. Kennington, J. Richenhaller

Objectives

To develop biologically sound mechanized techniques for the efficient and effective conduct of silvicultural operations in Canada; to develop and maintain agencies in Canada to promote and foster the application of mechanized silvicultural techniques.

Achievements

Developed a silvicultural equipment information bank and published a brochure describing the system and how to access it; produced the first two issues of a Mechanization of Silviculture newsletter, and distributed approximately 2500 copies; carried out cooperative field evaluations comparing seven scarifiers in Saskatchewan and assessing the Brücke moulder in British Columbia.

Goals for 1984-1985

To collaborate with the Canadian Pulp and Paper Association in organizing a mechanization of silviculture seminar; to publish a standard assessment procedure for evaluating silvicultural equipment; to publish a joint report with the Forest Engineering Research Institute of Canada on scarification trials, comparing the effects of full-tree and tree-length harvesting on scarification; to publish a report on aerial seeding of jack pine with a Venturi-type seeder.

REFORESTATION SILVICULTURE

Professional Staff: F.W. von Althen (Project Leader), J.B. Scarratt, R.F. Sutton, D.P. Webb, J.E. Wood

Support Staff: B.R. Canning, F.W. Curtis, D.L. Maries, E.G. Mitchell, T.P. Weldon

Objectives

To develop regeneration methods and associated tree growing techniques for efficient and effective stand establishment and treatment; to develop biologically sound techniques for conducting silvicultural operations in Canada.

Achievements

Published a comprehensive terminology of root and root system terms; published an evaluation of mounding site preparation for establishing jack pine and black spruce; completed a major study on the establishment of coniferous plantations in the boreal forest by conventional planting of bare-root stock; completed fifth-year remeasurements of containerised planting stock grade experiments in various locations in northern Ontario; introduced an extended greenhouse culture system which was successful in reducing winter damage; extended hardwood planting research to eastern Ontario to determine if techniques developed in southwestern Ontario were applicable.

Goals for 1984-1985

To complete a major study on establishment of coniferous plantations in the boreal forest by conventional planting of bare-root stock; to excavate seedlings in a 9-year-old spruce plantation to determine the effects of five different types of container on seedling growth performance and root morphology, and report on the results; to continue cooperative research with OMNR on the control mechanism of bud formation, needle primordia initiation and frost hardiness in spruce container stock, and their modification by cultural practice; to continue providing input into the National Research Council's Associate Committee on Scientific Criteria for Environmental Quality.



Forest Protection Research



FOREST FIRE RESEARCH

Professional Staff: B.J. Stocks (Unit Head), T.J. Lynham, D.J. McRae

Support Staff: T. Blake, G.R. Hartley, J.A. Mason

Objectives

To coordinate GLFRC fire research activities as part of Ontario's fire management program and to participate in the CFS national program; to develop improved pre-suppression techniques by means of fuel-specific fire behavior models for major fuel types and by performance analysis and calibration of the Canadian Forest Fire Danger Rating System for Ontario conditions; to determine the ecological effects of prescribed fire and wildfire on forest ecosystems and relate these to fire behavior parameters.

Achievements

Completed an 11-year experimental burning program in mature jack pine, with a total of 12 successful fires; completed a 5-year investigation into the behavior and impact of prescribed fire in boreal mixedwood logging slash in the Clay Belt Region of northern Ontario and published the results; completed a 3-year comparison of black spruce regeneration on prescription burned and mechanically scarified sites in northern Ontario; published two papers on fire weather and wildfire behavior in the boreal forest of northern Ontario.

Goals for 1984-1985

To organize the 1984 COJFRC symposium on forest fire management and the 18th North American Forestry Commission fire management study group meeting; to carry out a series of point-source experimental fires in immature jack pine and jack pine logging slash to monitor area growth rate in relation to time from ignition; to monitor operational prescribed burns in dead balsam fir residue and develop fuel consumption guidelines for this fuel type; to publish papers on fire behavior in mature and immature jack pine and budworm-killed balsam fir; to produce, in cooperation with other CFS fire researchers, a fire behavior prediction system.

GREMMENIELLA DISEASES OF CONIFERS

Professional Staff: C.E. Dorworth (Project Leader), S. Takai

Support Staff: C.N. Davis, W.C. Richards

Objectives

To develop ecologically satisfactory techniques for control of each race of *Gremmeniella abietina* as it attacks conifers and correlate disease syndromes with inceptive races; to investigate the biochemistry, genetics and physiology of *G. abietina* so as to understand the host-parasite interaction and develop control methods.

Achievements

Conducted differential host-pathogen trials in Europe, with European cooperators and with the European race of *G. abietina*; cooperated with European taxonomists to generate a new system of nomenclature for *G. abietina* and associated species; developed a new technique for generation of protoplasts and extraction of plasmid DNA from *Ceratocystis ulmi*, the pathogen responsible for Dutch elm disease; cooperated with OMNR personnel in the implementation of sanitation measures in pine plantations infected with *Gremmeniella* disease.

Goals for 1984-1985

To perform, with the approval of New Brunswick authorities, differential host inoculations with three races of *G. abietina* in that province and correlate pathogen race with disease syndrome; to screen various isolates of *C. ulmi* for production of plasmid DNA and adapt the technique for protoplast isolation to *G. abietina*; to identify a portion of the active enzymes of *G. abietina* and note differences in enzyme production by various races.

BOREAL MIXEDWOOD PATHOLOGY

Professional Staff: J.T. Basham (Project Leader), M. Dumas, R.D. Whitney

Support Staff: W.E. Britnell, R. Broadbent, B.E. Smith

Objectives

To develop silvicultural and management procedures and biological control methods to minimize the impact of root rot, stem decay and stem deterioration on the boreal mixedwood forest of Ontario, and to disseminate the acquired knowledge to potential users.

Achievements

Began studies on the biological control of stem decay and root rot and on the delineation and significance of *Armillaria* species involved in root rots; reported results of conifer plantation disease studies in Ontario, listing the most serious in each of five categories; published results of studies on the effects of scarification and herbicide spraying on the quality of aspen stands; in cooperation with two other CFS research centres published information on the impact of tree diseases in Canada and the success of chemical, sanitation and silvicultural control practices; discovered that *Armillaria* root rot is most severe in black spruce, white spruce and balsam fir on light-textured upland soils, and published this information.

Goals for 1984-1985

To publish reports on the impact of root rots in Ontario; to test several antagonistic microorganisms that occur in the wood of living trees against the major stem and root decay fungi in Ontario's boreal forest and against *Fomes annosus*, which causes root decay in southern Ontario conifer plantations; to publish guidelines for forest managers on salvaging stands containing budworm-killed timber.

SPRUCE BUDWORM CONTROL RESEARCH

Professional Staff: C.J. Sanders (Project Leader), G.T. Harvey, J. Régnière, W.L. Sippell (1983)

Support Staff: R.M. Fletcher, G.S. Lucuik, P.M. Roden

Objectives

In cooperation with other CFS research centres, to provide information required by forest managers on budworm control, particularly in Ontario; to evaluate and, where appropriate, develop to an operational level, acceptable methods of regulating budworm populations.

Achievements

Evaluated six types of pheromone traps for monitoring budworm populations in a wind tunnel and in the field, and made recommendations for use to Canadian and American CANUSA cooperators; established field plots and developed techniques for studying survival of budworm populations, to increase understanding of budworm population dynamics; developed computer models of budworm biology which include a new theory of budworm/disease interactions; identified, by electrophoresis, patterns of frequency of isoenzymes which reliably distinguish *Choristoneura fumiferana* from other closely related *Choristoneura* species; identified an effective sex attractant for the jack pine budworm.

Goals for 1984-1985

To establish a coordinated program using sex pheromone traps to monitor spruce budworm in eastern Canada; to play a key role in a CANUSA spruce budworm research symposium.

INSECT CONTROL RESEARCH EMPHASIZING BIOLOGICAL METHODS

Professional Staff: D.R. Wallace (Project Leader), D.B. Lyons, V.G. Nealis
(1984)

Support Staff: Z.M. Faux, S. Fera, D.L. Oliver

Objectives

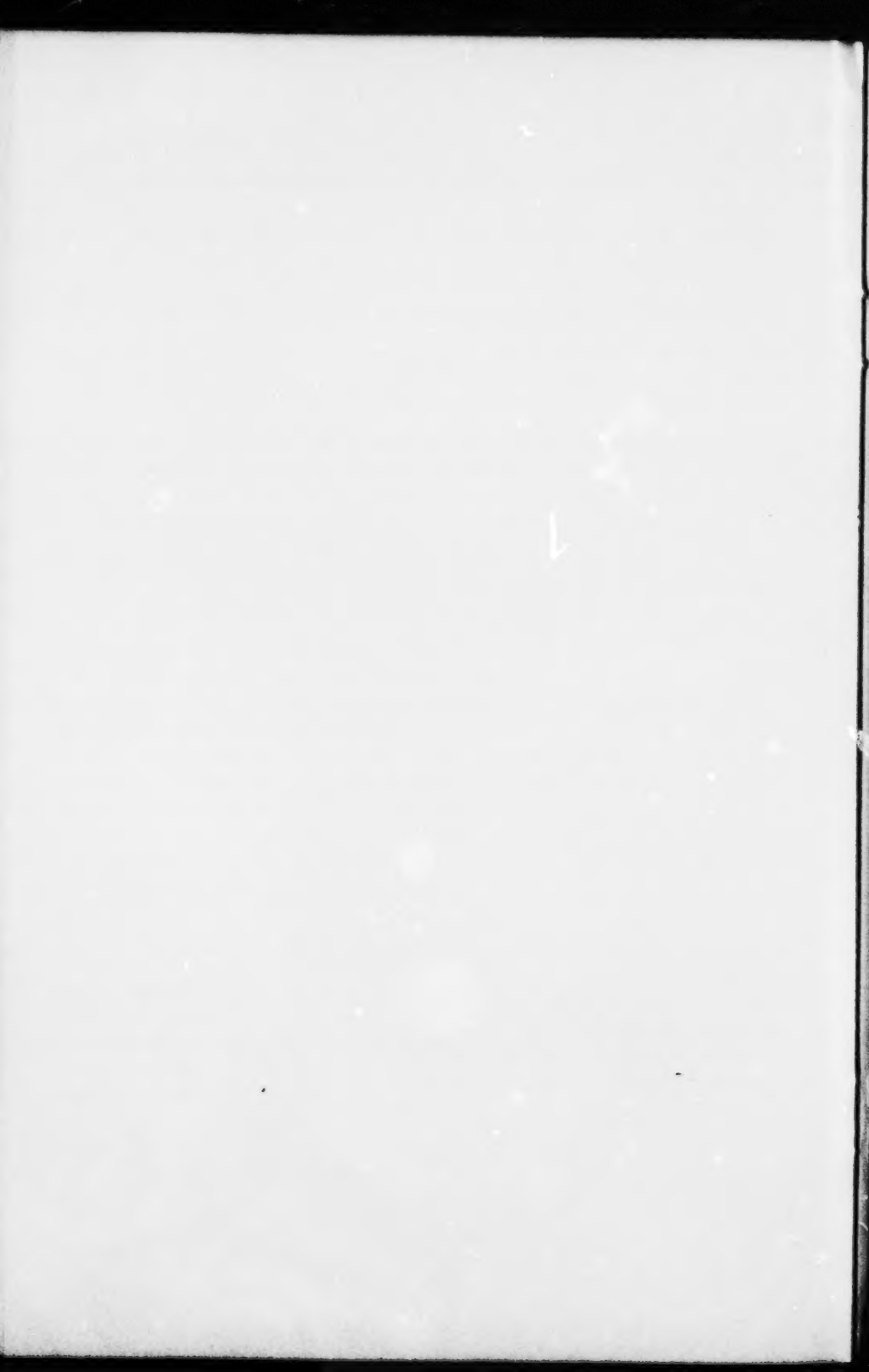
To develop economically acceptable methods for regulating insect numbers with minimal disruption of the environment, and to demonstrate the applicability of such methods to forest management in Ontario.

Achievements

Began a basic biological study of the pine false webworm in Ontario, to include population dynamics, the impact of feeding on host tree mortality and growth, and behavior and development of the sawfly, with particular reference to microclimate and biological control; in cooperation with the University of Guelph, accepted a Ph.D. student who began a study on the ecology of insect pests of black spruce cones and seeds and on the development of black spruce reproductive structures; provided materials, technical support and monitoring for parasitoid releases against gypsy moth, larch sawfly, and spruce budworm.

Goals for 1984-1985

To begin field and laboratory studies on *Apanteles fumiferanae*; to continue research on the pine false webworm; to terminate older studies and compile reports on them; to cooperate with a post-doctoral fellow who will begin work on parasitoid behavior and computer simulation.



Forest Utilization Research



ENERGY FROM FOREST BIOMASS

Project Staff: B.J. Sutherland (Project Leader)

Support Staff: D.J. Kennington

Objectives

To develop and test prototype equipment for the collection and comminution of forest biomass in the forest; to evaluate the potential of forest biomass as an alternative source of energy.

Achievements

Completed, under contract, the fabrication of the first prototype of the Crabe combine, a smallwood harvester for the reclamation of brushlands and the use of brushwood materials for energy production; completed, under contract with the Forest Engineering Research Institute of Canada, the fabrication of a logging residue processor, designed to comminute harvesting residues accumulated at landings for energy purposes.

Goals for 1984-1985

To undertake extensive field testing of the Crabe combine on a variety of smallwood sites in northern and southern Ontario for the purpose of evaluating the suitability of the first prototype.



Forestry Services



FOREST INSECT AND DISEASE SURVEY

Professional Staff: G.M. Howse (Unit Head), H.L. Gross, J.H. Meating, D.T. Myren, K. (Smith) Nystrom, D.B. Roden, P.D. Syme

Support Staff: M.J. Applejohn, C.A. Barnes, W.D. Biggs, H. Brodersen, D.C. Constable, L.R. Cree, E.J. Czerwinski, E.B. Dorworth, H.J. Evans, W.A. Ingram, V. Jansons, C.G. Jones, A.J. Keizer, H.D. Lawrence, L.S. MacLeod, R.K. McCron, Z. Moynan, R.J. Sajan, M.J. Thomson, H. Weir (1983)

Objectives

To provide information on the kind, severity, extent and impact of insect and disease problems in Ontario; to provide forest managers with information needed for decision making on control operations; to advise and assist the province in planning and evaluating control operations; to improve procedures used in insect and disease surveys and assessments; to elucidate the bionomics of little-known forest pests.

Achievements

Conducted aerial and ground surveys of the incidence of, and damage caused by, major forest pests in Ontario, identifying more than 3000 insect and 1200 disease samples and answering more than 2000 inquiries; conducted special surveys of pest problems in white pine, black spruce, maple, oak and jack pine stands and seed orchards; assessed provincial spraying operations against spruce budworm over 3500 ha in Hearst District and against oak leaf shredder over 580 ha in Huronia District; began or continued studies of the effects of specific insects or diseases on tree health.

Goals for 1984-1985

To conduct annual surveys of, and report on, major forest pest problems in Ontario; to publish a report on the impact of forest insects and diseases in Ontario forests from 1977 to 1981; to complete the manuscript of Tree Diseases of Eastern Canada; to conduct surveys for pests of white spruce plantations, seeds and cones; to participate in an early warning system for acid rain by monitoring damage caused in Ontario forests.

FOREST RESOURCES DATA

Professional Staff: J.H. Smyth (Project Leader)

Support Staff: A. Brownwright, K.L. Ramsay

Objectives

To provide forestry statistics required by the federal government for planning its programs and fulfilling its forestry obligations.

Achievements

Updated and modified the Ontario forest statistics information base; completed draft manuscripts on forest tree production centres in Canada (1983) and forest management expenditures in Canada (1977-1981); completed and distributed a report on corporate and other tax revenues generated by the forest industry in Ontario.

Goals for 1984-1985

To publish reports on statistics for the Ontario forest sector, forest tree production centres in Canada (1983) and forest management expenditures in Canada (1977-1981); to compile information on the status of forest industry labor settlements in 1984; to update the report on corporate and other revenues generated by the Ontario forest industry.

LIAISON, DEVELOPMENT AND TECHNICAL SERVICES

Professional Staff: C.R. Smith (Project Leader), J-D. Leblanc, B.J. Sutherland

Support Staff: F.F. Foreman, D.J. Kennington, J. Richenhaller

Objectives

To undertake, on behalf of the Centre, activities not directly related to existing forestry or environmental programs; to provide advisory, operational and technical support services to research staff and other agencies.

Achievements

Completed a draft forest management plan for Canadian Forces Base Borden; organized and sponsored, with OMNR, a symposium on jack pine management; prepared a report on 10-year growth response of jack pine to precommercial thinning for presentation at the jack pine symposium.

Goals for 1984-1985

To complete a long-range management plan for CFB Borden; to complete a report on the economics of precommercial thinning in jack pine.

ECONOMIC STUDIES AND DEVELOPMENT

Professional Staff: J.H. Smyth (Project Leader), S. Andersen, J.D. Johnson

Support Staff: A. Brownwright, K.L. Ramsay

Objectives

To provide advice to other federal departments, provincial government agencies, and private industry on programs concerned with forest management or forest industry development that are beyond the scope of current GLFRC programs; to provide economics input into program and project evaluation at GLFRC and elsewhere in the Department; to provide input into federal policy initiatives in forest management and forest industry development; to study the economic aspects of forest management and industry issues; to provide economic rationale in the development of Canada-Ontario forestry agreements.

Achievements

Completed draft manuscripts on Ontario's pulp and paper industry, on the sawmill and planing mill industry, and on the effect of tariff reductions on the fine paper industry; began a study of the corporate ownership structure in the Ontario forest sector; prepared background papers for use in the development of a new Canada-Ontario Forest Resource Development Agreement.

Goals for 1984-1985

To complete the study of corporate ownership structure in the Ontario forest sector; to begin a study of the Ontario newsprint industry; to participate in an analysis of the economics of precommercial thinning of jack pine; to assist OMNR in a workshop on the economics of silviculture.

Forestry Development



DEVELOPMENT AGREEMENTS

Professional Staff: D.W.J. McGowan (Project Leader), A.J. Ballak, G.D. Huntley, R.L. Macnaughton

Objectives

To manage and administer the Forest Management Subsidiary Agreement (FMSA) and to monitor progress and expenditures; to evaluate the FMSA in conjunction with involved provincial agencies; to ensure adequate federal participation in public relations activities connected with the FMSA; to complete development of a new Forest Resource Development Agreement (FRDA) expected to become effective in 1984.

Achievements

Approved one major amendment to the FMSA, which involved a reduction in the Nursery Expansion Program and establishment of a Forest Renewal Program; prepared a plan for evaluation of the FMSA; in cooperation with OMNR and the Ontario Ministry of Treasury and Economics, produced the outlines of a new FRDA consistent with federal policy and the forestry situation in Ontario; prepared documentation to support this proposed agreement.

Goals for 1984-1985

To manage the FMSA efficiently and participate in evaluation of the agreement and implementation of recommendations; to complete negotiations and documentation for the new FRDA, and begin implementation of it.

EMPLOYMENT STIMULATION

Professional Staff: D.W.J. McGowan (Project Leader)
A.J. Ballak, G.D. Huntley, R.L. Macnaughton

Objectives

To provide job opportunities in the forest sector, through projects that will contribute to forest renewal, public awareness of forestry, intensive forest management, forest protection, the environment and conservation.

Achievements

Through the Unemployment Insurance/Job Creation Program-Forestry Sector (UI/JC-FS) approved a total of 137 projects, providing more than 43,000 weeks of work for 21,000 participants; negotiated a contract for evaluation of the impact of the job creation program on Indian reserves in Ontario, with funding to be provided jointly by the CFS and the Department of Indian Affairs and Northern Development; screened and prioritized 140 applications representing 24,000 work weeks for more than 1300 participants in the Environment 2000 program, scheduled to begin early in 1984-1985.

Goals for 1984-1985

To prepare an overall report on the UI/JC-FS including the results of contract evaluation of work on Indian reserves; to implement and administer the Environment 2000 program so as to maximize forestry benefits and employment opportunities.

**Administration,
Financial Services and
Property Management**



ADMINISTRATION, FINANCIAL SERVICES AND PROPERTY MANAGEMENT

Staff: R.M. Dean (Chief)

E.L. Baxter, W. Borland, W.R. Clarke, L.M. Cormier, D. Evoy, D.W. Gair, J. Graham, R.J. Graham, C. Halliday, J.W. Harazny (1983), A. Jones, J.C. Kimball, G.A. King, L.J. Koivisto, J. Lang, J. Longo, H.J. Logtenberg, S. MacLeod, J. McAlpine (1983), B. McBain, B.I. McKay, G. McLeod, B. McMurray, M. Mills, R. Moffatt, E.F. Morningstar, C. Novick, J. Novick, K. Pelletier, M.G. Pinder, D.C. Reid, M. Skouris, D.I. Sloan, E.C. Steinke, F.C. Stewart, M.T. Stone, J. Theriault (1984), D.G. Weeks, A. Willis, A. Zurby

Objectives

To provide administrative, financial, and research and technical support services for GLFRC, and to operate and maintain the physical plant and grounds.

Achievements

Purchased a fifth word processing console for typing services; negotiated a contract for a high-speed photocopier to reduce rental costs by 25%; processed 8000 documents through Material Management; erected a new cottage for the FIDS technician in Chapleau District; completed major repairs at ranger stations in Angus, Geraldton and Fort Frances; repainted about 90% of the offices and labs in the laboratory wing under an employment stimulation program; implemented a financial system to provide adequate control over grants and contributions; introduced an internal financial reconciliation and forecast procedure to simplify computerized information for managers.

Goals for 1984-1985

To replace 13 vehicles and dispose of 13 old ones; to establish a Contract Review Committee in accordance with Treasury Board and DOE guidelines; to obtain approval and begin implementing a new stored logic communications system; to replace the administration and laboratory wing roofs in the main complex; to continue upgrading FIDS stations; to design a hydronic heating system for the "Ranger" building; to speed up delivery of financial summaries to managers; to review internal financial procedures and highlight areas of inadequate control.



**Biometrics and Applied
Software Service and Computer
Facilities and Services**



**BIOMETRICS AND APPLIED SOFTWARE SERVICE AND
COMPUTER FACILITIES AND SERVICES**

Professional Staff: N. Bailey, D.W. Bellhartz, J.E. Field, I.M-J. Kwain

Support Staff: D. Grave

Objectives

To provide advice on all aspects of data gathering, assistance in data entry, scientific data processing and analysis, and training for staff in the use of software packages; to acquire and maintain software packages; to provide advice on system capability, access to computer facilities, advice on computerized equipment requiring interfacing with the central computer, technical aid and training in the use of equipment and software, linkage of computerized equipment with the central computer, and assistance in transfer of information on tape to and from external systems.

Achievements

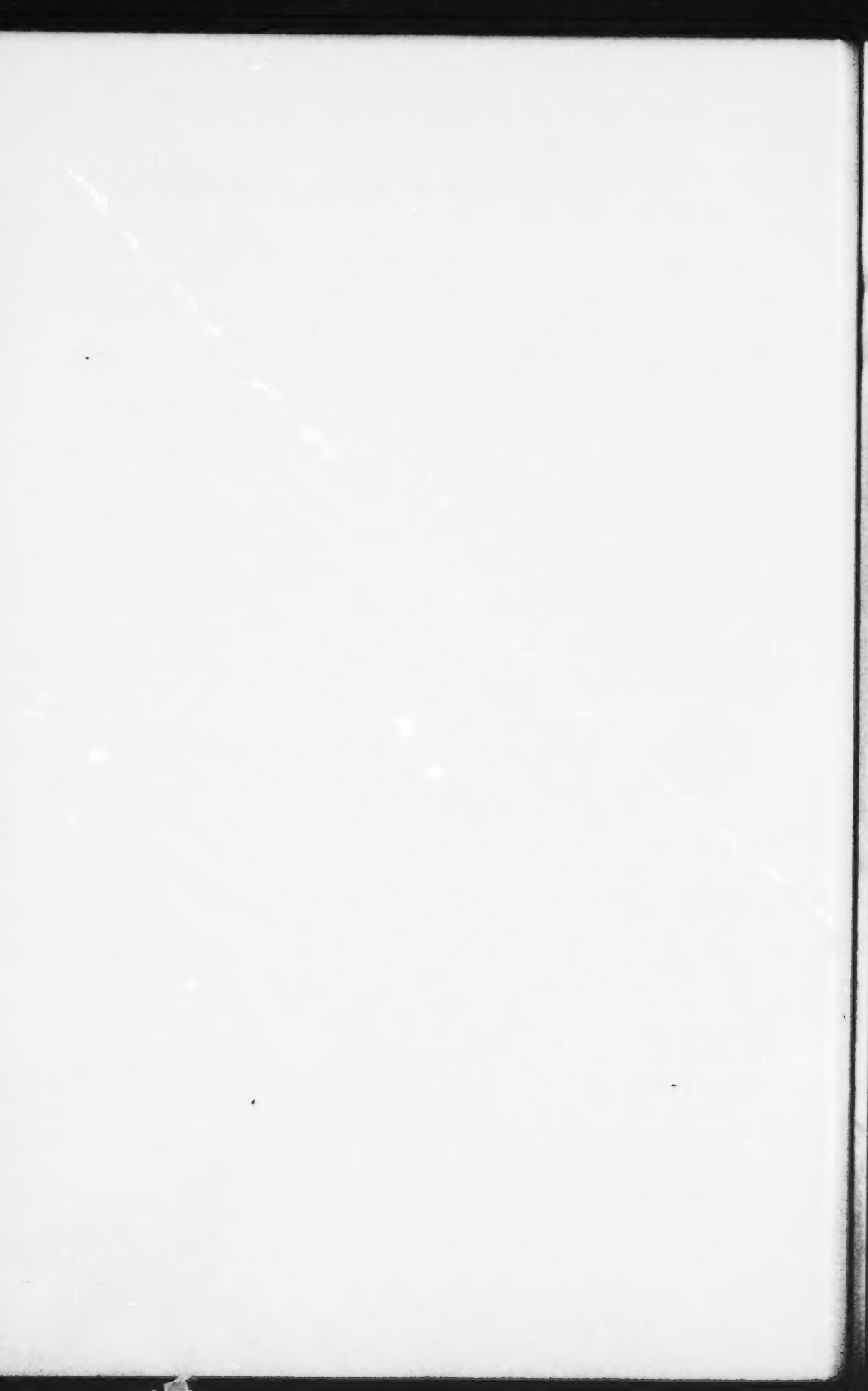
Developed a grid search program for estimating parameters of non-linear regression equations, prepared an accompanying manual, and presented a seminar to research staff on its use; planned and presented training workshops in BMDP use and data screening methods for research staff; planned for and acquired a VAX 750 computer to replace a PDP 11/70; acquired 14 terminals and an additional multiplexor to provide better computer access; acquired three Rainbow personal computers and printers; interfaced two auto-analyzers in the LRTAP lab with the computer system and developed laboratory data management software for collecting, modifying and reporting research results and managing sample analysis.

Goals for 1984-1985

To develop microcomputer applications for management and forestry development staff and to train staff involved in their use; to develop a training program for research staff in the use of application software for the VAX 750 computer, and to transfer or convert existing information from the old system to the new; to develop training courses for support staff and general users of the computer system and Digital software; to continue integrating laboratory, administrative and general computer equipment, making use of the SL-1 PABX integrated voice and data communications system to be installed in 1984-1985.



Technical Support Services



TECHNICAL SUPPORT SERVICES

Staff: C.L. Bodley (Electronics Technician), S.B. Burt (Librarian), N.J. Dukes (Library Clerk), M. Laporte (Greenhouse Technician), J.A. Ramakers (Chemical Analysis Laboratory Technician), E.R. Rayner (Photographer)

Objectives

To provide efficient and economical research and technical support services to GLFRC.

Achievements

Carried out 110,000 chemical analyses on soil, plant and water samples; operated greenhouse, electronics and photography services to meet program needs; updated library computer search services and the serials holdings list; began production of a library handbook and updated the library collection development policy.

Goals for 1984-1985

To carry out 120,000 chemical analyses on plant, soil and water samples; to upgrade chemical analysis capability with newly acquired ion chromatographic and nitrogen-analysis equipment; to investigate the possibility of including serials holdings in the Union List of Scientific Serials in Canadian Libraries; to organize a CAN/OLE workshop for training of local library staff.



**Scientific and Technical
Information Services**



SCIENTIFIC AND TECHNICAL INFORMATION SERVICES

Professional Staff: C.A. Plexman (Unit Head)

Support Staff: P. Jakibchuk, D.J. Kennington, M.K. Rouse, L.F. (Chassé)
Weist

Objectives

To publish and disseminate scientific and technical information issuing from GLFRC's research and development programs in response to the needs of provincial and industrial forest managers, and to promote an understanding of the wide use of forest resources among the general public; to promote public awareness, appreciation and understanding of Canada's forested environment through personal experience.

Achievements

Published over 120 scientific papers and reports, and assorted newsletters and bulletins; completed an audio-visual program on the Centre's research and development program; launched a number of major projects for National Forest Week; began preparations for an Open House and visit by the Minister of the Environment; prepared the text for a biographical booklet on professional staff; distributed over 75,000 publications in response to requests; assisted in preparation of a communications plan for the new FRDA; organized and conducted summer tours; participated in various forestry exhibitions; held public consultation meetings in several northern Ontario towns; opened the forest ecology trail to the public, and maintained and improved existing facilities; planted 24 trees and six shrubs in the arboretum.

Goals for 1984-1985

To continue publishing and disseminating information issuing from the Centre's research and development programs; to complete preparations for National Forest Week and the Open House; to produce special publications, including a new GLFRC brochure; to continue involvement in the communications aspects of the FRDA; to participate in a cooperative education program with the Sault Ste. Marie Board of Education; to continue the summer tour program; to participate in the regional public consultation program; to continue the arboretum planting program and prepare labels for all trees; to continue maintenance of the forest ecology trail and open it to the public.

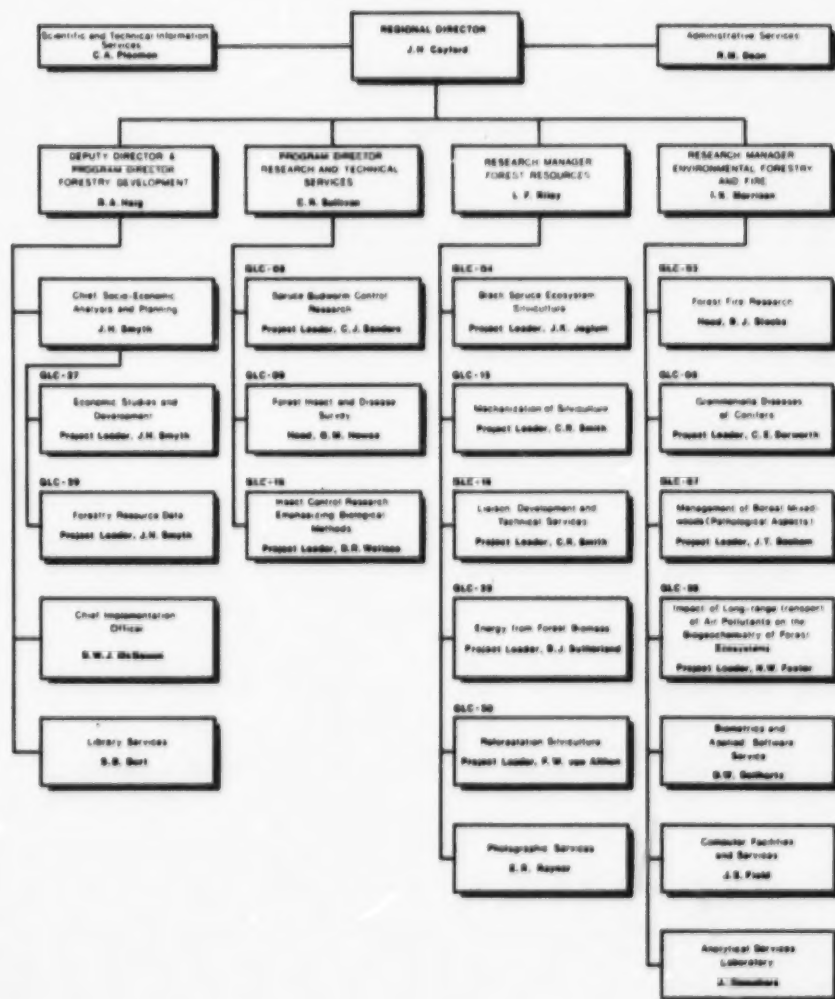


Appendices



GREAT LAKES FOREST RESEARCH CENTRE

ORGANIZATION CHART



EXPENDITURES

(\$'000)

Project	Person years	Salaries	Operation and maintenance	Capital	Grants and contributions	Total
Forest Environment Research						
Impact of Long-range Transport of Air Pollutants on the Bio- geochemistry of Forest Eco- systems	6.0	250.6	173.9	48.1	-	472.6
Forest Production Research						
Black Spruce Ecosystem Silvi- culture	12.0	417.0	96.5	74.4	-	587.9
Mechanization of Silviculture Reforestation Silviculture ^a	13.5	379.0	106.7	81.3	-	567.0
Forest Protection Research						
Forest Fire Research	6.0	189.7	51.2	13.9	-	254.8
Cronenhiella Diseases of Conifers	4.0	136.8	19.5	68.2	-	244.5
Boreal Mixedwood Pathology	6.0	235.4	17.3	17.3	-	270.0
Spruce Budworm Control Research	7.0	380.9	30.4	41.6	-	452.9
Insect Control Research Empha- sizing Biological Methods	6.0	172.6	23.9	79.7	-	278.2
Forest Utilisation Research						
Energy from Forest Biomass	0.5	18.9	-	0.2	-	19.1
Forestry Services						
Forest Insect and Disease Survey	27.0	894.7	106.9	47.4	-	1,049.0
Forest Resource Data	1.0	47.4	2.0	-	-	49.4
Liaison, Development and Technical Services	1.0	38.0	7.8	-	-	45.8
Forestry Development						
Economic Studies and Development	1.5	110.6	6.1	0.5	-	117.2
Development Agreements	4.0	116.5	44.9	4.6	8,133.7	8,299.7
Employment Stimulation	5.5	160.4	52.9	-	4,212.3	4,425.6
Management	8.0	349.6	83.1	1.0	-	433.7
Administration, Financial Services and Property Management	40.0	937.0	1,040.1	331.3	185.5	2,326.4
Biometrics and Applied Software Service and Computer Facilities and Services	5.0	142.1	38.2	149.7	-	350.0
Technical Support Services	6.0	176.0	155.5	57.8	-	389.3
Scientific and Technical Infor- mation Services	4	104.6	37.6	1.2	-	143.4

^aExpenditures for Reforestation Silviculture are included with those for Mechanization of Silviculture for fiscal 1983-1984.

CONTRACTS LET OR SUPERVISED BY THE GREAT LAKES FOREST RESEARCH CENTRE

Contractor's Name	Contract Title	Contract Amount (1983-1984 only)
Research and Productivity Council P.O. Box 6000 Fredericton, N.B.	Isolation, identification and synthesis of host-related chemical attractants to the native elm bark beetle	\$36,400
Mattson Forestry Consul- tants Inc. 143 Leo Ave. Sault Ste. Marie, Ont.	Ecological assessment of strip cutting in upland black spruce	\$21,550
University of Guelph Guelph, Ont. Dr. G.P. Lunis	Growing media evaluation for germina- tion and early growth of coniferous seedlings in aerial darts	\$16,292
Art Jakalanen Jr. R.R. #1 Nipigon, Ont.	Study of soil and water samples	\$ 2,640
Research and Productivity Council P.O. Box 6000 Fredericton, N.B.	Chemical identification of possible secondary components of the spruce budworm sex pheromone	\$18,000
Queen's University Kingston, Ont.	The degeneration effects of acid precipitation	\$11,649
University of Toronto Toronto, Ont. Dr. T.C. Hutchison	Determination of the toxicity of aluminum to the root system of boreal forest tree species	\$29,218
Mr. Axel Denner 54 Maple Ave. Dundas, Ont.	Production of videotaped presentation describing a forest ecosystem classification	\$ 2,200
Mr. H.G. McPhee 92 Indiana Sault Ste. Marie, Ont.	Field work and data collection to assure the continuity of eight provenances of jack pine	\$ 1,990
Dr. K.J. Griffiths	To develop a simulation model to study the temporal synchrony between <i>Exenterus</i> parasitoids and their host, the European pine sawfly, <i>Neodiprion sertifer</i>	\$ 1,999
University of Waterloo	Analysis of growth-yield data according to prescribed procedures and available software packages such as BHDP and Minitab	\$ 3,100
Horton Forestry Service	Preparation of a manuscript for a GLFRC report, summarizing the development of mechanised black spruce cone collection in Ontario	\$ 5,000
University of Waterloo	Analysis of research data according to prescribed procedures	\$ 3,700
Dr. J.W. Andresen	Analysis of the impact of the 83-84 U.I. job creation program - forestry sector on Indian reserves in Ontario	\$20,000

(continued)

CONTRACTS LET OR SUPERVISED BY THE GREAT LAKES FOREST RESEARCH CENTRE (concluded)

Contractor's Name	Contract Title	Contract Amount (1983-1984 only)
University of Toronto Dr. C.D. Puttock Dr. V.G. Smith	Analysis of data gathered by CPS on upland black spruce site preparation	\$19,686 (PRUF funding) ^a
Lakehead University N.G. Marchison F.R. Clark	Applicability of probability distribu- tion as a tool for predicting yield of immature black spruce and jack pine plantations	\$25,200 (PRUF funding)
University of Toronto Dr. M. Hubbes	Manipulation of the host-pathogen system to control Armillaria root rot	\$23,000 (PRUF funding)
University of Toronto Dr. D.L. Martell	Prediction of people-caused forest fire occurrences	\$27,100 (PRUF funding)
University of Waterloo Prof. E.B. Dumbroff	Drought tolerance and the physiological mechanisms of resistance in northern coniferous seedlings	\$19,850 (PRUF funding)
Forest Engineering Research Institute of Canada 143 Place Frontenac Pointe Claire, Quebec	Optimisation of the shearing action and pick-up efficiency of the Recufor Rotor	\$24,200 (ENFOR funding) ^b
Elme Design	Fabrication of a brushwood harvester head complete with chipper chip conveyor assembly	\$196,000 (ENFOR funding)
Elme Design	Lease agreement for rental of a universal go-tract carrier to be used in the contract entitled "Fab. Mod. Assembly"	\$ 5,100 (ENFOR funding)
Forest Engineering Research Institute of Canada 143 Place Frontenac Pointe Claire, Quebec	Field testing of experimental proto- type roll splitter	\$10,400 (ENFOR funding)
Forest Engineering Research Institute of Canada 143 Place Frontenac Pointe Claire, Quebec	Development of a system to process biomass residues from full trees - processing phases I, II and III	\$446,900 (ENFOR funding)
Forest Engineering Research Institute of Canada 143 Place Frontenac Pointe Claire, Quebec	Development and testing of a roll splitter	\$ 5,000 (ENFOR funding)
Forest Engineering Research Institute of Canada 143 Place Frontenac Pointe Claire, Quebec	Collection of field data under three different full-tree harvesting systems	\$19,780 (ENFOR funding)
G. Christine Hanville	Identification of sphagnum, other moss specimens and peat materials using micro- scopic analysis	\$ 2,100 (Peat Forum funding)
R.S.W. Bobette 148 Kampenfeldt Drive Barrie, Ont.	Assessment of peatland classification using LANDSAT imagery	\$21,140 (Peat Forum funding)
Ontario Centre for Remote Sensing	Provision of remote sensing interpreting interpretations for multi-spectral data	\$ 8,125 (Peat Forum funding)

^aPRUF = Program of Research by Universities in Forestry^bENFOR = Energy from the forest

ENFOR and Peat Forum funds are provided under the federal government's Program for Energy Research and Development (PERD).

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